

Construction Activities
Stormwater Management Plan
North Bay at Lake Woodmoor
El Paso County, Colorado

SUMP

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Kiowa Project No. 15073

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STORMWATER PLAN OBJECTIVES

The objective of the Stormwater Management Plan (SWMP) is to define controls and measures to maintain water quality by eliminating or reducing pollutants in stormwater discharges during construction activities. A general schedule or phasing of Best Maintenance Practices (BMPs) will be determined by construction schedule and ground disturbances necessitating required erosion control methods/BMPs. Evaluations of and modifications to this plan may be necessary during the length of the construction project until the site is finally stabilized. This SWMP should be reviewed and modified as a part of the overall process of evaluating and managing stormwater quality issues on a regular basis. A copy of the Stormwater Discharge Permit, SWMP, SWMP Site Map (Figure 2) and inspection logs shall be kept on site by the SWMP Administrator as to be available to federal, state and local agencies for inspection.

A Construction Activities Stormwater Discharge Permit has been applied for on _____ from the Colorado Department of Public Health and Environment and is included in Appendix 1. The general conditions associated with this permit should be followed through the duration of the land disturbing activities at the site. For additional details or more specific information, consult CDPS General Permit No. COR-030000 in Appendix 2.

I. SITE DESCRIPTION

A. Nature of the Construction Activity

North Bay at Lake Woodmoor will be a single family attached residential development of 28 lots located south of the intersection of Deer Creek Road and Burning Oak Way. See Vicinity Map (Figure 1) on the following page. Construction activities include the construction of 28 homesites, access roads, and utility and stormwater infrastructure.

B. Sequence of Major Activities

Construction activities for the project are expected to begin in the winter of 2016. Prior to the commencement of the majority of clearing and grubbing activities, minimal clearing and grubbing may be necessary prior to install the initial erosion control features such as erosion control logs and vehicle tracking control. Subsequent to the installation of the erosion control logs and vehicle control, clearing and grubbing will commence and grading will proceed as shown on the SWMP Site Map (Figure 2). When the finished grades are attained, utility, roadway and stormwater infrastructure will be installed. In general, the SWMP Administrator will identify the precise schedule to be used during the term of this project.



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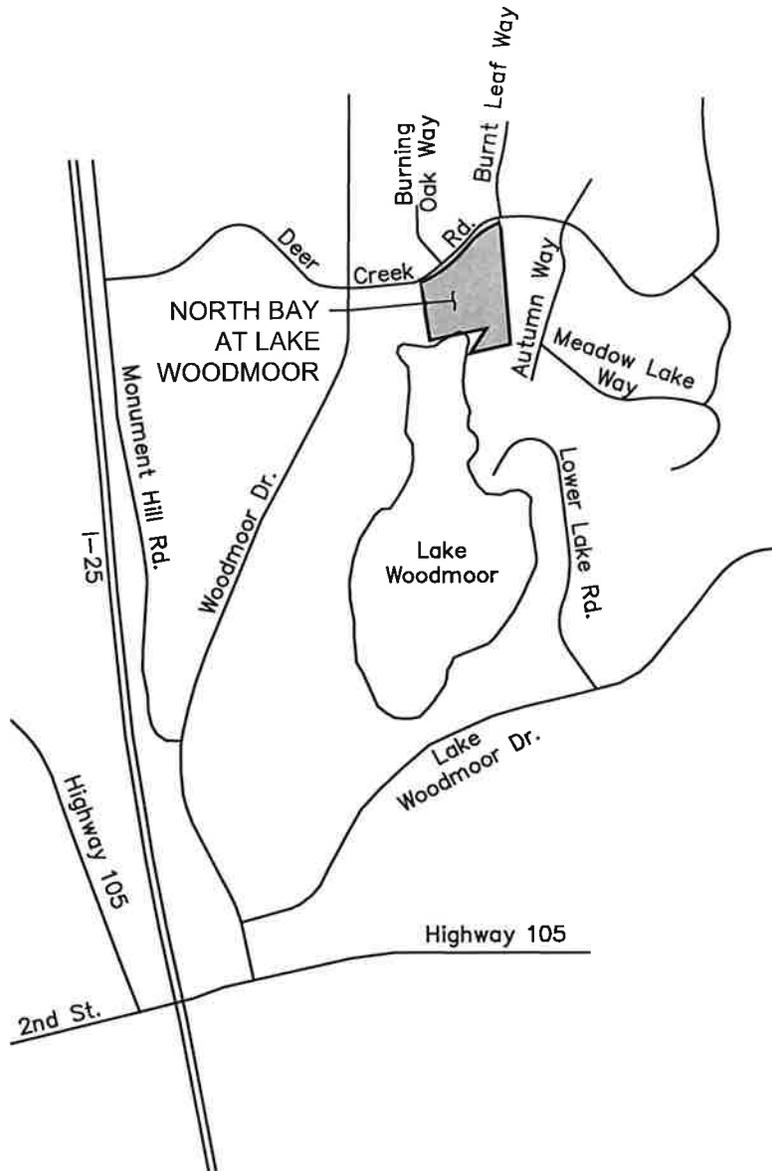


FIGURE 1

North Bay at Lake Woodmoor
Vicinity Map
El Paso County, Colorado

PROJECT NO. 15073

Kiowa
Engineering Corporation

1604 South 21st Street
Colorado Springs, Colorado 80904
(719) 630-7342

Temporary erosion control measures are anticipated to be removed in the winter of 2017.

Final Stabilization is anticipated to occur in the spring of 2018

C. Estimate of Area and Volume Disturbed

The project area totals 7.23 acres of which approximately 4.6 acres will be subject to disturbance. The estimated acres of disturbance corresponds to that necessary to install access roads, buildings, building pads, driveways, landscaping, stormwater facilities, and utilities. Locations of disturbed areas are as shown on the SWMP Site Map (Figure 2.) All other areas are to remain undisturbed.

Earthwork cut and fill operations are more than 500 cubic yards.

D. Soil Data

Soil within the property is classified within Hydrologic Soils Groups B and D as shown in the El Paso County Soils Survey. The predominant soil types on the site are Pring course sandy loam and Alamosa loam. Pring course sandy loam is characterized as a deep, noncalcareous, well-drained soil formed in sandy sediment with rapid permeability and blowing soil hazard. Alamosa loam is characterized as a deep poorly drained soil formed in alluvium on flood plains with moderately slow permeability and a slight erosion hazard.

The pre-construction and the post-construction run-off coefficients are 0.53 and 0.57, respectively.

E. Existing Vegetation and Ground Cover

Vegetation cover within the site consists primarily of short grass prairie vegetation.

The site vegetation was evaluated on _____ according to protocol recommended in the "Erosion Control and Stormwater Quality Guide" by the Colorado Department of Transportation (Section 4.11.1). Per guidelines, _____ fifty-foot transects were taken with results of __%, __% and __% with an average existing vegetation cover of __%.

F. Potential Pollution Sources

The location of all potential pollution sources, including ground breaking disturbing activities, vehicle fueling, storage of fertilizers or chemicals, concrete or asphalt batch plants, concrete washouts, among numerous other potential pollutants shall be enumerated in this SWMP. Further descriptions and locations can be found in Section III B 1 thru 13 of this report.

G. Non-stormwater Discharges

At this time, no non-stormwater components of discharge, such as springs, landscape irrigation return flows, construction dewatering or other discharges are known to exist. If any non-stormwater components of discharge are known to exist, these items will be addressed in Section III C 8 of this report. If any non-stormwater discharges become apparent during the term of

construction, the occurrence and mitigation shall be addressed in an addendum by the SWMP Administrator.

H. Receiving Waters

The project area will drain centrally to the Upper Lake Fork of Dirty Woman Creek and then to Lake Woodmoor. Lake Woodmoor discharges to Dirty Woman Creek Which then outfalls to Monument Creek, and ultimately to the Arkansas River.

II. SWMP SITE MAP

The Stormwater Management Plan Site Map (Figure 2) is included in Appendix 4 and identifies the following:

- A. Construction site boundaries;
- B. All areas of ground disturbance;
- C. Areas of cut and fill;
- D. Areas used for storage of building materials, equipment, soil, or waste;
- E. Locations of dedicated asphalt or concrete batch plants;
- F. Locations of all structural BMPs;
- G. Locations of non-structural BMPs where applicable;
- H. Locations of springs, streams, wetlands, detention basins, irrigation canals, roadside ditches and other surface waters.

The SWMP Site Map must be updated by the SWMP Administrator on a regular basis to reflect current conditions of the site at all times.

III. STORMWATER MANAGEMENT CONTROLS

A. SWMP Administrator:

The Owner shall designate the SWMP Administrator. The SWMP Administrator will likely be the Contractor or his/her designated representative and is responsible for developing, implementing, maintaining and revising the SWMP. Should the SWMP Administrator change for any reason, it shall be noted on this Plan.

SWMP Administrator: _____

B. Identification of Potential Pollutant Sources:

At a minimum, the following activities and sources shall be evaluated for the potential to contribute pollutants to stormwater discharges. The SWMP Administrator shall determine the need for and locations of each of the following potential pollutant sources during the course of the construction

project. The sources of any potential pollutants must be controlled through BMP selection and implementation.

1. All disturbed and stored soils;
2. Vehicle tracking of sediments;
3. Management of contaminated soils;
4. Loading and unloading operations;
5. Outdoor storage activities (building materials, fertilizers, chemicals, etc.);
6. Vehicle and equipment maintenance and fueling;
7. Significant dust or particulate generating processes shall be controlled by sprinkling with water and other appropriate means;
8. Routine maintenance activities involving fertilizers, pesticides, detergents, fuels, solvents, oils, etc.
9. On-site waste management practices such as waste piles, liquid wastes, dumpsters, etc.
10. Concrete truck/equipment washing, including the concrete truck chute and associated fixtures and equipment;
11. Dedicated asphalt and concrete batch plants;
12. Non-industrial waste sources such as worker trash and portable toilets; and
13. Any other areas or procedures where potential spills could occur.

C. Best Management Practices (BMPs) for Pollution Prevention

1. Best Management practices for erosion and sediment control implemented on the site to minimize erosion and sediment are:

Structural practices to be used on-site are straw bale check dams, erosion control logs, silt fences, drainage swales, inlet protection, vehicle tracking control, erosion control blankets and a temporary sediment basin. Minimal clearing and grubbing may be necessary prior to installing the initial erosion control features such as silt fences and vehicle tracking control. Prior to any construction activities, erosion control logs around proposed grading areas as shown on attached Figure 2 will be installed. Vehicle tracking control will be installed to manage sedimentation from construction vehicles exiting the site. Inlet protection will be installed to filter stormwater before entering any watercourses. Final stabilization is anticipated to occur in the spring of 2018.

2. Non-structural practices for erosion and sediment control to be used to minimize erosion and sediment transport are:

Minimize the amount of existing vegetation to be removed during construction, leaving native vegetation in place when possible. Only the existing vegetation that is specified or requiring removal shall be disturbed or removed. If possible, leave existing ground cover, including asphalt in place or remove just prior to grading to minimize the length of soil exposure.

3. Phased BMP Implementation will not be utilized.

4. Materials handling and spill prevention:

The site superintendent will inspect daily to ensure proper use and disposal of materials on-site including building materials, paints, solvents, fertilizers, chemicals, waste materials and equipment maintenance or fueling procedures. All materials stored on-site will be stored in a neat and orderly manner in the original containers with the original manufacturer's label, and if possible under a roof or other enclosure. Before disposing of the container, all product will be used up whenever possible and manufacturer's recommendations for proper disposal will be followed per state and local regulations.

Material and equipment necessary for spill cleanup will be kept in the material storage area on-site. Manufacturer's recommendations for spill cleanup will be posted and site personnel will be made aware of the procedures along with the location of the information and cleanup supplies.

5. Concrete and asphalt batch plants:

Dedicated concrete or asphalt batch plants is unknown.

6. Vehicle tracking control:

Off-site vehicle tracking of sediment shall be minimized and is as shown on the SWMP Site Map. Streets shall be kept clean and free of mud, soil and construction waste. Street sweeping or other acceptable methods shall be used to prevent sediment from being washed from the project site. Streets shall not be washed down with water. Street cleaning operations shall occur if necessary or as directed by El Paso County.

7. Waste management and disposal including concrete washout:

A concrete washout areas shall be specified in locations near concrete work areas. Concrete wash water shall not be discharged to state waters or to storm sewer systems. The washout area shall be a shallow excavation with a small perimeter berm to isolate concrete truck washout operations. At the end of construction, all concrete shall be removed from the site and disposed of at an approved waste site. Signs shall be placed at the washout to clearly indicate the concrete washout area to operators of concrete trucks and pump rigs.

All construction site waste both liquid and solid must be contained in approved waste containers and disposed of off-site according to state and local regulations. Locations are shown on the SWMP

Site Map. Portable sanitary facilities shall be provided at the site throughout the construction phase and must comply with state and local sanitary or septic system.

8. Groundwater and stormwater dewatering:

Groundwater and/or stormwater dewatering is possible for this site. If groundwater or stormwater dewatering is required, locations and practices to be implemented to control stormwater pollution from excavations, etc. will be noted on the SWMP Site Map. A separate CDPHE discharge permit maybe required for groundwater dewatering.

IV. FINAL STABILIZATION AND LONG TERM STORMWATER MANAGEMENT

Final stabilization is anticipated to occur during Spring 2018. Final stabilization is reached when all soil disturbing activities at the site have been completed and uniform vegetative cover has been established with a density of at least 70 percent of pre-disturbance levels, or equivalent permanent, physical erosion reductions have been employed. For the purposes of the SWMP, establishment of a vegetative cover capable of providing erosion control equivalent to pre-existing conditions at the site can be considered final stabilization. The contractor will be responsible for providing the documentation to make this comparison to the State of Colorado, Water Quality Control Division.

The project site shall be seeded with the seed mix as shown on the SWMP Site Plan, where the application methods and soil preparations are also found. All slopes greater than three-to-one will be covered with erosion control blankets.

Management of storm water after completion of construction will be accomplished by utilizing the practices listed below.

- Upon completion of construction, the site shall be inspected to ensure that all equipment, waste materials and debris have been removed.
- The site will be inspected to make certain that all graded surfaces have been paved, landscaped or seeded with an appropriate ground cover.
- All silt fence, inlet protection, sediment logs, curb socks and all other control practices & measures that are to remain after completion of construction will be inspected to ensure their proper functioning.
- The contractor shall remove erosion control measures that are not required to remain.

After all construction activities are completed on the site, but final stabilization has not been achieved, the contractor shall make a thorough inspection of the stormwater management system at least once every month.

The contractor shall be responsible for maintaining the storm water controls in good working order and shall also be responsible for the costs incurred until such time as final stabilization is reached. Once final stabilization has been achieved the contractor shall be responsible for removal of the erosion control measures.

Should any of the erosion control facilities become in disrepair prior to the establishment of the native or natural erosion control measures, the Contractor is responsible for the cost of such maintenance. The Contractor is also responsible for the clean up of offsite areas affected by any sediment that may leave the site. Control of erosion from areas disturbed by utility or building construction will be the responsibility of the respective contractor. All erosion control measures shown on the plan shall be installed and maintained in accordance with Best Management Practices.

V. RECOMMENDED INSPECTION AND MAINTENANCE PROCEDURES

A. Minimum Inspection Schedule

- a) **Frequency.** Contractor should inspect Construction BMP's at the following times and intervals.
 - (1) After installation of any Construction BMP;
 - (2) Within 24 hours after any runoff event that causes erosion;
 - (3) At least once every 14 days, but a more frequent inspection schedule may be necessary to ensure that BMPs continue to operate as needed to comply with the permit.
 - (4) Consult Permit No. COR-030000 for alternate inspection requirements at temporarily idle sites, at completed sites, or for winter conditions.
- b) **Inspection Log.** The SWMP Administrator should record the inspection results on a site-specific standardized inspection log to be maintained and kept at 1755 Telstar Drive, Suite 211, Colorado Springs, Colorado, for review by agencies, until 30 days after completion of land disturbances. A template for the inspection log format is included in Appendix 3. The SWMP Administrator should develop site-specific inspection logs that itemize the selected Construction BMP's for their site. At a minimum the following information from each inspection should be recorded on the site-specific log:
 - (1) Date of inspection;
 - (2) Name and title of inspector;
 - (3) Location(s) of discharges of sediment or other pollutants from the site;
 - (4) Location(s) of BMPs that need to be maintained;

- (5) Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
- (6) Location(s) where additional BMPs are needed that were not in place at the time of inspection;
- (7) Deviations from the minimum inspection schedule as provided in the permit;
- (8) Descriptions of corrective actions for any item above, date(s) of corrective actions taken, and measures taken to prevent future violations, including requisite changes to the SWMP, as necessary and
- (9) After corrective action(s) have been taken, or where a report does not identify any incidents requiring corrective actions, the report shall contain a signed statement indicating the site is in compliance with the permit to the best of the signer's knowledge and belief.

B. BMP Operation and Maintenance.

The SWMP Administrator is responsible for operation and maintenance of construction BMPs. The SWMP Administrator will inspect the site per inspection and monitoring protocol outlined above and will make any necessary repairs to construction BMPs immediately after a defect or other need for repair is discovered. The project site and the adjacent streets impacted by the construction shall be kept neat, clean and free of debris. The erosion control measures and facilities will be maintained in good working order until final stabilization. Any items that are not functioning properly or are inadequate will be promptly repaired or upgraded. Records of inspections must be kept and be available for review by the State of Colorado Water Quality Control Division or El Paso County.

REFERENCES

The following reports and plans were used in the process of preparing this Stormwater Management Plan:

1. *CDPS General Permit: Stormwater Discharges Associated with Construction Activity Permit No. COR-030000*. Colorado Department of Public Health and Environment. July 1, 2012.
2. *Final Drainage Report North Bay at Lake Woodmoor*. Kiowa Engineering Corporation. 2016.
3. *Erosion Control and Stormwater Quality Guide*. Colorado Department of Transportation. 1995.
4. *Dirty Woman Creek and Crystal Creek Drainage Basin Planning Study*. Kiowa Engineering Corporation. 1993.
5. *City of Colorado Springs and El Paso County Drainage Criteria Manual*. October 1997.
6. *City of Colorado Springs Drainage Criteria Manual Volume 2*. November 2002.
7. *Soil Survey of El Paso County Area, Colorado*, prepared by United States Department of Agriculture Soil Conservation Service. June 1981.
8. *FIRM Flood Insurance Rate Map Number 08041C0276F*. Federal Emergency Management Agency. March 17, 1997.
9. *Geologic Hazards Evaluation & Preliminary Geotechnical Investigation for North Bay at Lake Woodmoor Subdivision, Woodmoor Drive & Willow Park Way, Monument Colorado*. CTL Thompson, Inc. 2013.
10. *U.S.G.S. 7.5-minute Monument Quadrangle Map. El Paso County, Colorado*. 1981. U. S. Department of the Interior. 1981.

APPENDIX 1
SWMP Application

APPENDIX 2

Construction Activity Stormwater Permit

APPENDIX 3

Evaluation of Construction BMP's Form

Stormwater Field Inspection Form (Construction Projects)

El Paso County Colorado Stormwater Management Program

Phone (719) 520-6826 Fax (719) 520-6879

Email: johnchavez@elpasoco.com

General Information

Name of Project/Site: _____ ESQCP#: _____

Address/Directions: _____

Name(s) of Onsite Representative(s): _____ phone: _____

Permit Holder (If not permitted, Owner or Operator)

Owner Name: _____ Name of Responsible Person: _____

Title of Responsible Person: _____ Phone: _____

Address: _____

ECS Name: _____ ECS Phone Number: _____

Inspector(s): _____ Inspecting Agency: _____

Persons present: _____

Type of Inspection: Self Monitoring Initial Compliance Recon Other: _____

Date conducted: _____ Pictures Taken? Yes No

Construction start date? _____

Records Review

Copy of SWMP confirmed on site? Yes No

SWMP Review:

1. Site description as required in the permit? Yes No
Notes: _____

2. Site map as required in the permit? Yes No
Notes: _____

3. BMPs for stormwater pollution prevention:

a. Erosion and sediment controls as required in the permit? Yes No
Notes: _____

b. Materials handling and spill prevention? Yes No
Notes: _____

4. Final Stabilization and long term stormwater management as required in the permit? Yes No
Notes: _____

5. Other controls as required in the permit? Yes No
Notes: _____

6. Inspection and maintenance as required in the permit? Yes No
Notes: _____

Inspection records kept? Yes No

Inspections conducted as required in the permit? Yes No

Notes: _____

APPENDIX 4
SWMP Site Map
Figure 2

APPENDIX 5

Details of Construction BMPs

Figures 3, 4, and 5

- INSTALLATION REQUIREMENTS**
1. CURB PROTECTION SHALL BE INSTALLED IMMEDIATELY AFTER CONSTRUCTION OF THE CURB AND SHALL BE PROTECTED BY A 12" CURB OVER THE CURB.
 2. CURB SHALL BE PROTECTED BY A 12" CURB OVER THE CURB.
 3. CURB SHALL BE PROTECTED BY A 12" CURB OVER THE CURB.
 4. CURB SHALL BE PROTECTED BY A 12" CURB OVER THE CURB.
 5. CURB SHALL BE PROTECTED BY A 12" CURB OVER THE CURB.



CURB SOCKET INLET PROTECTION (R-2)
 NTS



BLOCK AND GRAVEL BAG INLET PROTECTION (R-3)
 NTS



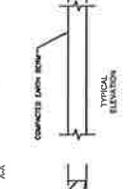
STRAW BALE INLET PROTECTION (R-4)
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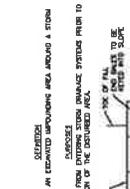
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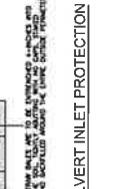
CURB INLET PROTECTION (R-1)
 NTS



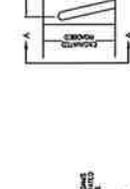
BLOCK AND GRAVEL BAG INLET PROTECTION (R-3)
 NTS



STRAW BALE INLET PROTECTION (R-4)
 NTS



FILTER FABRIC INLET PROTECTION (R-5)
 NTS



CURB INLET PROTECTION (R-1)
 NTS



BLOCK AND GRAVEL BAG INLET PROTECTION (R-3)
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STRAW BALE INLET PROTECTION (R-4)
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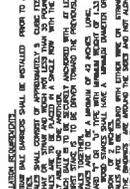
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CURB INLET PROTECTION (R-1)
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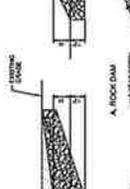
BLOCK AND GRAVEL BAG INLET PROTECTION (R-3)
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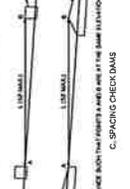
STRAW BALE INLET PROTECTION (R-4)
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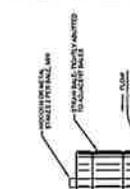
FILTER FABRIC INLET PROTECTION (R-5)
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CURB INLET PROTECTION (R-1)
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BLOCK AND GRAVEL BAG INLET PROTECTION (R-3)
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STRAW BALE INLET PROTECTION (R-4)
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FILTER FABRIC INLET PROTECTION (R-5)
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CURB INLET PROTECTION (R-1)
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BLOCK AND GRAVEL BAG INLET PROTECTION (R-3)
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STRAW BALE INLET PROTECTION (R-4)
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FILTER FABRIC INLET PROTECTION (R-5)
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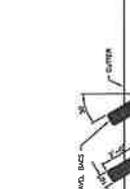
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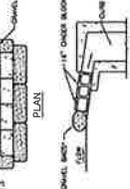
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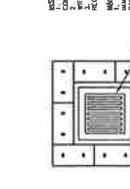
CURB INLET PROTECTION (R-1)
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BLOCK AND GRAVEL BAG INLET PROTECTION (R-3)
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STRAW BALE INLET PROTECTION (R-4)
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FILTER FABRIC INLET PROTECTION (R-5)
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CURB INLET PROTECTION (R-1)
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BLOCK AND GRAVEL BAG INLET PROTECTION (R-3)
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STRAW BALE INLET PROTECTION (R-4)
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BLOCK AND GRAVEL BAG INLET PROTECTION (R-3)
 NTS

STRAW BALE INLET PROTECTION (R-4)
 NTS

FILTER FABRIC INLET PROTECTION (R-5)
 NTS

CURB INLET PROTECTION (R-1)
 NTS

BLOCK AND GRAVEL BAG INLET PROTECTION (R-3)
 NTS

STRAW BALE INLET PROTECTION (R-4)
 NTS

FILTER FABRIC INLET PROTECTION (R-5)
 NTS

CURB INLET PROTECTION (R-1)
 NTS

BLOCK AND GRAVEL BAG INLET PROTECTION (R-3)
 NTS

STRAW BALE INLET PROTECTION (R-4)
 NTS

FILTER FABRIC INLET PROTECTION (R-5)
 NTS

APPENDIX 6

Soils Borings and Tests and Groundwater